



JOHN F. KENNEDY SPACE CENTER



NASA LAUNCH SERVICES PROGRAM

**DISCOVERY 2019 AO
PHASE A STUDY KICKOFF
MARCH 25, 2020**

**P. Jason Jagdmann
Flight Projects Office**



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Launch Services Program



The Launch Services Program (LSP) provides:

- **Procurement and management of the launch service**
- **Technical insight/approval of the launch vehicle (LV) production/test**
 - **Mission Management and engineering support**
 - **Oversight (approval) of mission unique launch vehicle hardware/software development**
- **Launch campaign/countdown management – formal readiness reviews**
- **Risk management for launch service**
- **Downrange telemetry assets for launch vehicle data**



NASA Provided Launch Services



- **The NASA Launch Services (NLS) II Contract is LSP's primary method to acquire all classes of Category 2 and Category 3 commercial launch services for spacecraft (SC) customers (defined on page 9)**
- **Provides NASA with domestic launch services that are safe, successful, reliable, and affordable**
- **Provides services for both NASA-Owned and NASA-Sponsored payloads through multiple Indefinite Delivery Indefinite Quantity (IDIQ) Launch Service Task Order (LSTO) contracts with negotiated Not To Exceed (NTE) Prices**
- **Provides services on a Firm-Fixed-Price (FFP) basis**
 - **Incorporates best commercial practices to the maximum extent practical**
 - **Includes standard and non-standard services**
 - **Mission unique modifications**
 - **Special studies**
- **Allows LSP to turn on a task assignment or non-standard service at any time for analyses**



Launch Vehicle Requirement



Discovery AO 2019 Phase A

Requirement CS-30 Summary

- This section shall demonstrate compatibility with the proposed performance level launch vehicle as defined in the AO and the Program Library by providing:
- The fairing size, spacecraft mass, launch mass margin, mission orbit characteristics such as altitude, (km – circular or apogee/perigee) inclination, C3, heliocentric and/or declination (DLA).
- Any non-standard requirements such as additional fairing doors, cleanliness and purge requirements, planetary protection, etc., shall be described.
- The packaged flight system in the proposed fairing, with critical clearance dimensions, and preliminary estimates of launch loads and structural margins shall be included.



Vehicles Projected to be Available Under NLS II



- **Most likely candidate vehicles for the Discovery AO that are projected to be available on the NLS II contract in the 2026/2029 timeframe are**
 - Antares 232
 - Falcon Heavy
 - Falcon 9
 - Vulcan (ULA), **New Glenn (Blue Origin), Omega (Northrup Grumman)**
 - » **Vehicles expected to be on-ramped to NLS II in CY 2020**
 - **No changes to the performance classes in the Launch Services Information Summary**
- **Assumption of a specific launch vehicle configuration as part of this AO proposal will not guarantee that the proposed LV configuration will be selected for award of a launch service competitive procurement**
- **Bidders must remain compatible with vehicles LSP is projecting to be available on the NLS II contract**
- **And, remain compatible with NLS II contractual capabilities and not rely on the launch vehicle providers users guides when determining LV configurations and performance**
 - **Proposers are advised to plan for compatibility with all that provide their performance requirements that are expected to be available through spacecraft Preliminary Design Review**
 - **Payload design should accommodate the limiting/enveloping launch characteristics and capabilities included in “Launch Services Information Summary” document**



NLS II Contracts Overview



- **Launch Services Risk Mitigation Policy for NASA-owned and/or NASA-sponsored Payloads/Missions can be found under NPD 8610.7. Document can be found at <http://nodis3.gsfc.nasa.gov>**
 - Risk Category 1: Low complexity and/or low cost payloads-Classified as Class D payloads pursuant to NPR 8705.4
 - **Risk Category 2: Moderate complexity and/or moderate cost payloads-Classified as Class C payloads and, in some cases, Class B payloads, pursuant to NPR 8705.4**
 - Risk Category 3: Complex and/or high cost payloads-Classified as Class A payloads and, in some cases, Class B payloads, pursuant to NPR 8705.4
- **NLS II Launch Service Costs**
 - **Acquisition process begins at approximately L-36 months**
 - **Authority to Proceed (ATP) concurrent with task order award at approximately L-30 months (+/- 3 months)**
 - » Cumulative payment of 10% due at L-30 (Nominal)
 - » Nominal mission integration begins
 - **Costs not covered by the Discovery Program include items such as:**
 - » **Mission unique/non-standard services such as a custom/mission-specific payload adapters, auxiliary propulsion, extreme cleanliness/contamination sensitivities, launch services associated mission utilizing radioactive material (See Attachment 2 of the Launch Services Information Summary document)**
 - » **Payload-caused launch delay costs**



Launch Service Budget



- **The standard launch service includes:**
 - **Procurement and management (including risk management) of the launch service, technical insight/approval of the launch vehicle production/test and mission unique launch vehicle hardware/software development**
 - » **Engineering, analysis, and minimum performance standards and services provided by the contract (insight and approval)**
 - **Launch vehicle (as a service)**
 - **Launch site payload processing facility and support, logistics, hazardous support**
 - **Range support and services, contractor engineering support, base support contracts**
 - **Down range telemetry support (launch vehicle only)**
 - **Launch campaign/countdown management – formal readiness reviews**
 - **Mission integration management**



Launch Service Budget (cont'd)



- **The standard launch service for this AO specifically includes:**
 - **Nominal allocation for non-standard/mission unique launch vehicle modifications/services – items typically necessary to customize the basic vehicle hardware to meet spacecraft driven requirements: T-0 GN2 purge, ISO 14644-1 Class 7 integration environment and interleaved SC telemetry – and mission unique reviews**
 - **Launch vehicle is categorized as a high performance launch vehicle with a 5-m payload fairing for a no later than Dec 31 2026 or Dec 31 2029 launch**
 - **Payload fairing with approximately two (2) nominal access doors with thermal and/or acoustic blankets (N/A to nuclear payloads)**
 - **Standard LV-provided payload separation system**
 - **Standard payload adapter (1194)**
 - **Standard test payload adapter availability**
 - **Spacecraft spin/de-spin capability for separation (if required)**
 - **Single-Spacecraft**
 - **Collision/contamination avoidance maneuver (CCAM) capability if needed**
 - **Electrical interface connectors (approximately 3 sets)**
- **Budget does not include launch delays**



Launch Services Budget (cont'd)



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- **Non Standard launch services that are NOT covered under the LSP budget and cost must be included in the PI-managed mission cost (or adjusted cost cap):**
 - Nuclear launch services utilizing a RHU/MMRTG
 - Enhanced contamination control, planetary protection, operational clean enclosures
 - Cameras on the LV
 - Extended mission integration periods (in excess of 33 months)
 - LV hardware modifications required to accommodate unique payload configuration (e.g.1666 adapter)

- **Less capable launch vehicles or smaller fairings as shown:**

2026 Launch Readiness Date		
Performance Class	4m	5m
Low	+\$15M to Adjusted Cost Cap	+\$15M to Adjusted Cost Cap
Medium	N/A	+\$10M to Adjusted Cost Cap
Intermediate High	N/A	No Change to Cost Cap



Launch Service Acquisition



- **The acquisition of the launch service will include a domestic launch vehicle procured and managed by the NASA/Launch Services Program (LSP)**
- **The LSP will competitively select a launch service provider for these missions based on customer requirements and NASA Flight Planning Board (FPB) approval**
- **At the conclusion of the Phase A study it is recommended to have an initial draft of the Launch Service Interface Requirements Document (LS-IRD) which will be needed to start the launch vehicle acquisition process.**



Summary



- **It is the Launch Services Program's goal to ensure the highest practicable probability of mission success while managing the launch service technical capabilities, budget and schedule**
- **Questions must be officially submitted to:**

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Mission Manager

NASA Launch Services Program

Code VA-C

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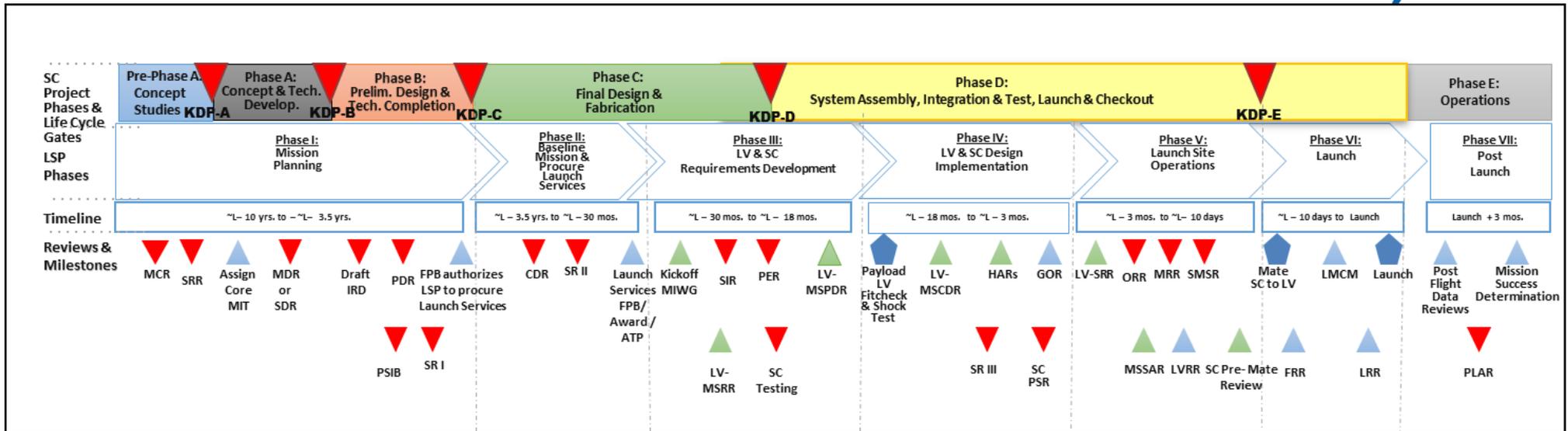
LAUNCH SERVICES PROGRAM

Back Up



Mission Life Cycle

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Legend

- ▼ Spacecraft
- ▲ LSP
- ▲ Launch Service Contractor
- ◆ Spacecraft & Launch Vehicle

ATP: Authority to Proceed
CDR: Critical Design Review
FPB: Flight Planning Board
FRR: Flight Readiness Review
GOR: Ground Operations Review
HAR: Hardware Acceptance Review
IRD: Interface Requirements Document
LMCM: Launch Management Coordination Meeting
LRR: Launch Readiness Review
LV-MSCDR: Launch Vehicle-Mission Specific Critical Design Review
LV-MSPDR: Launch Vehicle-Mission Specific Preliminary Design Review

LV-MSRR: Launch Vehicle-Mission System Requirements Review
LVRR: Launch Vehicle Readiness Review
LV-SRR: Launch Vehicle System Readiness Review
MCR: Mission Concept Review
MDR: Mission Definition Review
MIT: Mission Integration Team
MIWG: Mission Integration Working Group
MRR: Mission Readiness Review
MSSAR: Mission Specific Systems Acceptance Review
ORR: Operational Readiness Review

PDR: Preliminary Design Review
PER: Pre-Environmental Test Review
PLAR: Post-Launch Assessment Review
PSIB: Payload Safety Introduction Briefing
SC PSR: SC Pre-Ship Review
SDR: Systems Definition Review
SIR: System Integration Review
SMSR: Safety & Mission Success Review
SR (I-III): Safety Review
SRR: System Requirements Review



LSTO Process



- **HQ Flight Planning Board (FPB) notifies LSP of mission requirement**
 - **Launch Services Interface Requirements Document (LSIRD) has already been developed by SC customer & provided to HQ FPB and to LSP (LSP works with SC customer to develop LSIRD)**
- **Launch Services Program Manager notifies procurement officer of requirement and provides recommended technical personnel for LSTO evaluation team**
- **Procurement officer establishes LSTO evaluation team with designated contracting officer and lead tech evaluator**
 - **Note that the team includes up to 2 or 3 reps from the spacecraft project team**
- **LSTO evaluation team performs the following:**
 - **Develop tech requirements based on mission definition**
 - **Assures FAR guidelines are being followed**
 - **Determines and documents LSTO evaluation criteria**
 - **CO issues Request for Launch Services Proposal (RLSP) to multiple contractors**



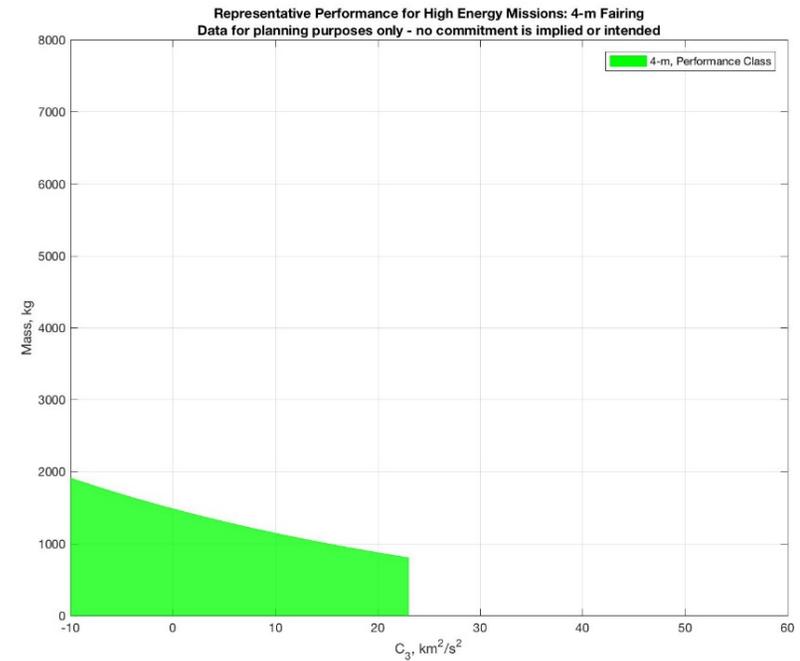
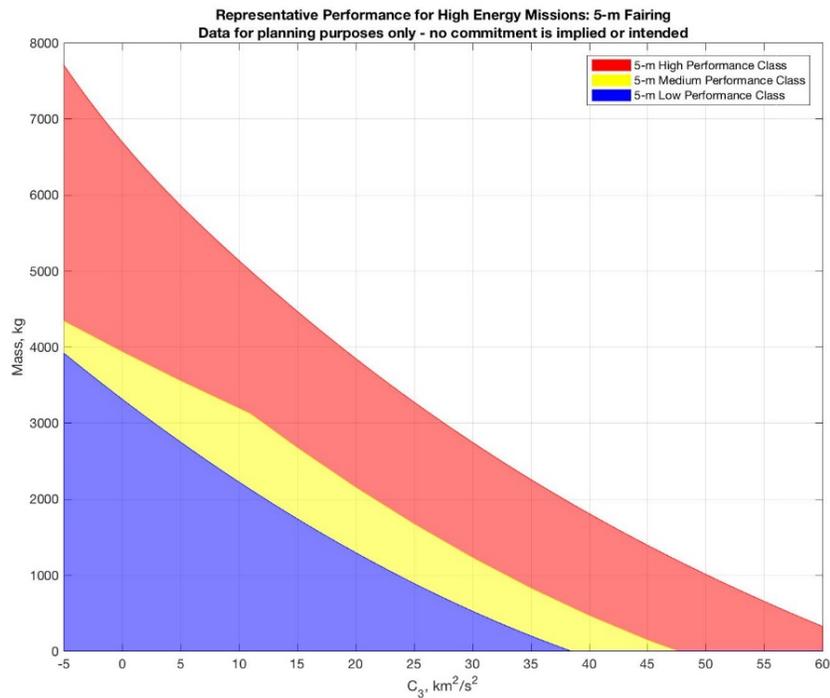
LSTO Process



- **LSTO evaluation team performs the following (cont'd):**
 - Evaluate contractor proposals in accordance with LSTO procedures
 - Complete evaluation and brief to procurement officer, LSP Program Manager, FPB, sponsoring Program/Project on evaluation results
 - Verify status of Authority To Proceed (ATP)
- **Launch Services Program Manager makes selection and coordinates with KSC Contracting Officer (CO)**
- **KSC CO awards LSTO for mission launch service**



Launch Services Characteristics/Capabilities



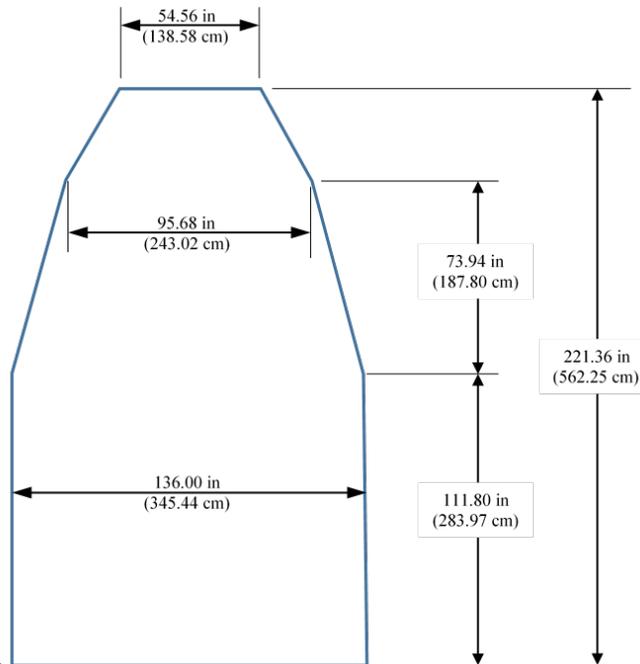
Appropriate fairing must be used for each performance class



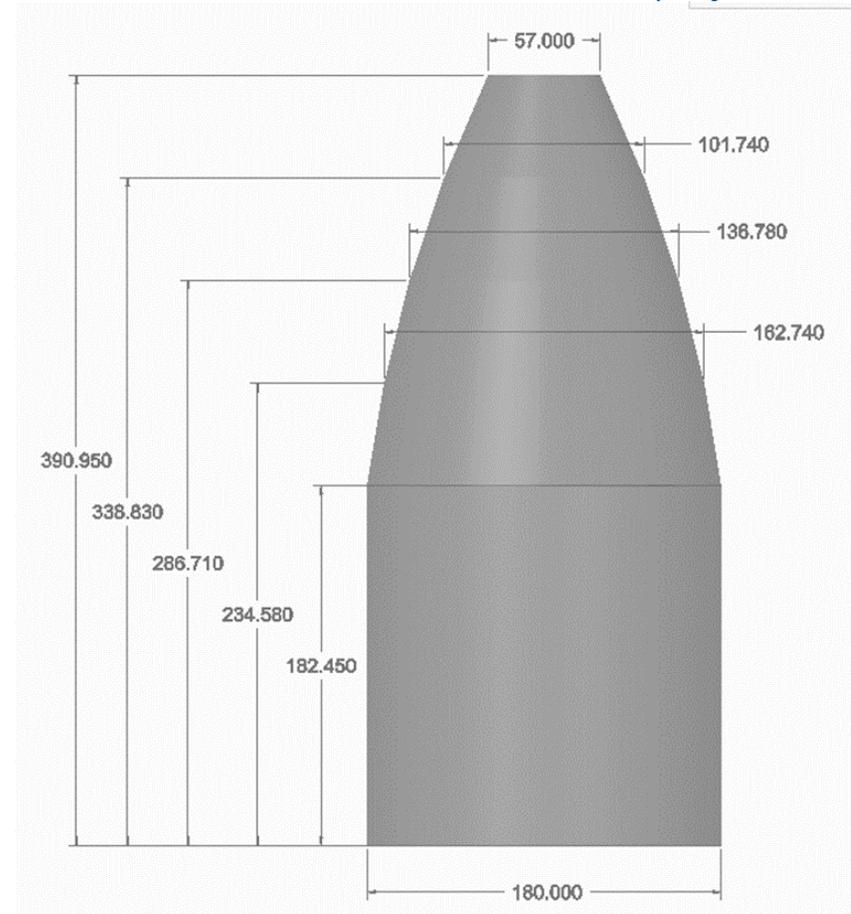
Payload Fairings (not to scale)



Separation Plane for an
1194 Separation System



4m Static Payload Fairing Envelope



**5m Static Payload Fairing Envelope
(Low, Medium and High Performance Class)**